

Remarks:

Reconsideration of the application, as amended herein, is respectfully requested.

Claims 5, 7 and 8 are presently pending in the application.

Claim 5 has been amended. Claims 1 - 4 and 6 were previously canceled.

In item 1 of the above-identified Office Action, claims 5 and 8 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U. S. Patent No. 5,668,385 to Bauer et al ("BAUER") in view of German Patent Publication No. 39177769 A1 to Gerstenmaier et al ("GERSTENMAIER"). In item 2 of the Office Action, claim 7 was rejected under 35 U.S.C. § 103(a) as allegedly being obvious over BAUER in view of GERSTENMAIER, and further in view of U. S. Patent No. 5,684,323 to Tohyama ("TOHYAMA").

Applicants respectfully traverse the above rejections, as applied to the amended claims.

More particularly, claim 5 has been amended to recite, among other limitations:

a stop zone in front of said emitter region, said stop zone having foreign atoms with at least one energy level within the band gap of the semiconductor and at least 200 meV away from both a conduction band and a

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valence band of the semiconductor, resulting in said stop zone being only partially electrically active in the on-state and fully electrically active in the off-state for carriers emitted by the emitter region, said stop zone and said emitter region having mutually opposite conductivities. [emphasis added by Applicants]

As such, Applicants' amended claims require, among other things, that the stop zone is only partially electrically active in the on-state and fully electrically active in the off-state for carriers emitted by the emitter region. The amendment to claim 5 is supported by the specification of the instant application, for example, on page 8 of the instant application, lines 20 - 23, which states:

In the production of a power semiconductor, a stop-zone is generated before the emitter region, for example by anode side implantation of foreign atoms. [emphasis added by Applicants]

Thus, as the instant application discloses a stop zone in front of the emitter, and the emitter described in the instant application is the **only** disclosed emitter of carriers in connection with the instant invention, it can be seen that the stop zone is effective for carriers emitted by the emitter region, as presently claimed.

However, neither of the cited **BAUER** or **GERSTENMAIER** references teach or suggest Applicants' particularly claimed stop zone for stopping carriers emitted by the emitter region.

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More particularly, page 3 of the Office Action states, in part:

*F. Bauer et al do not teach the further limitation that said atoms of said doping substance have at least one energy level within the band gap of the semiconductor and at least 200meV away from both a conduction band and a valence band of the semiconductor. [emphasis in original]*

Rather, page 3 of the Office Action, alleged, in part, that

**GERSTENMAIER:**

*. . . teach that in n-type recesses 11 (cf. col. 2, 1.4) between p-emitter portions 4 (cf. col. 1, 1. 53-57) on the anode (A) side (cf. Figure 1) the dopant should be selected so as to have an ionization energy level within the band gap of the semiconductor and at least 300 meV away, a fortiori at least 200 meV away, from both a conduction band and a valence band of the semiconductor (cf. col. 2, 1. 49 - col. 3, 1. 17), for the specifically stated purpose to reduce the temperature dependence of the threshold current (cf. abstract and col. 2, 1. 30 - col. 2, 1. 17) through an increase in the slope of the conductivity versus temperature. [emphasis in original]*

Applicants respectfully disagree that the combination of **BAUER** and **GERSTENMAIER** would teach or suggest Applicants' currently claimed invention.

More particularly, **GERSTENMAIER** discloses a thyristor with shorted emitter structure, in which the shorts, or base extensions, (i.e., reference numbers 11, 11a and 11b of **GERSTENMAIER**) are part of the base (i.e., reference number 3

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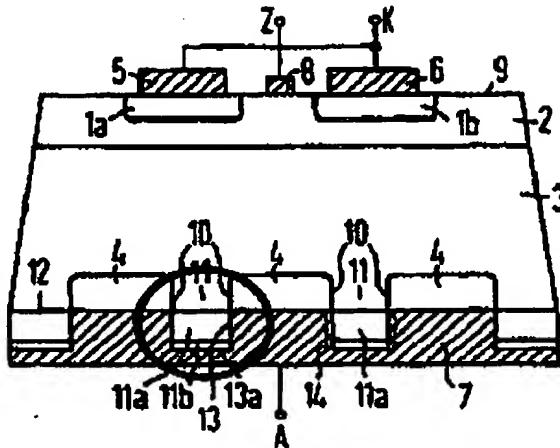
of **GERSTENMAIER**) extending through the emitter zone. These shorts/base extensions are in electrical contact with the electrode (reference number 7 of **GERSTENMAIER**). See also, col. 2 of **GERSTENMAIER**, lines 30 - 34, and the abstract of **GERSTENMAIER**.

**GERSTENMAIER** discloses that the foreign atoms **are only** in part 11a and, optionally in part 11b of the base extensions. See, col. 2, lines 49 - 53 ("Die Heißleitung der n-leitenden Teile 11a und gegenbenenfalls 11b wird durch Einbringung eines Dotierstoffes . . . erreicht" - trans., *The thermal conduction of the n-conducting parts 11a and if necessary 11b is obtained by inserting a doped material*).

For purposes of discussion, Fig. 1 of **GERSTENMAIER** has been reproduced herebelow. Note that, Applicants have circled a portion of Fig. 1, for providing greater clarity in discussion.

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FIG 1



As can be seen from Fig. 1 of **GERSTENMAIER**, the base extensions 11a and 11b containing the foreign atoms are **not** located in front of the emitter (4 of Fig. 1 of **GERSTENMAIER**), but are located, instead, behind the emitter 4 (i.e., within the circled portion). Further, any "stop zone" in **GERSTENMAIER** that may be formed in the portions 11a and 11b of the base extensions **affects carriers** coming from the electrode 7, and **not carriers emitted by the emitter 4**.

As such, neither **GERSTENMAIER**, nor **BAUER**, teach or suggest, among other limitations of Applicants' claims, a **stop zone located in front of an emitter region, and having foreign atoms** (i.e., in the stop zone), **affecting carriers emitted by the emitter region**, as required by Applicants' claim 5. As such, the combination of **GERSTENMAIER** and **BAUER** cannot teach or suggest, and thus, cannot render obvious, Applicants' claimed invention.

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The **TOHYAMA** reference, cited in the Office Action in connection with **GERSTENMAIER** and **BAUER** against Applicant's dependent claim 7, does not cure the above-discussed deficiencies of the **GERSTENMAIER** and **BAUER** references.

It is accordingly believed that none of the references, whether taken alone or in any combination, teach or suggest the features of claim 5. Claim 5 is, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 5.

In view of the foregoing, reconsideration and allowance of claims 5, 7 and 8 are solicited.

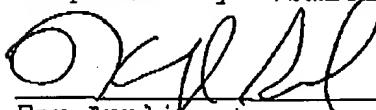
In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested, as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

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If an extension of time for this paper is required, petition  
for extension is herewith made.

Please charge any fees that might be due with respect to  
Sections 1.16 and 1.17 to the Deposit Account of Lerner  
Greenberg Steiner LLP, No. 12-1099.

Respectfully submitted,



For Applicants

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